IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Jitaru

Serial #: 09/434,985 Docket #: 1675B.1A.1
Filed: 11/05/99 Examiner:
Group:

For: Low Noise Full Integrated Multilayers Magnetic For Power Converters

COLLECTION OF CLAIMS

Honorable Commissioner of Patents and Trademarks
Washington D.C. 20231

Sir:

For clarity of reference, the following is a list of the claims now pending in the above identified application.

From the Original Filing: (1-15)

1. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets;

b) a first transformer having,

1) a first core extending through said layers of dielectric sheets, and,

2) a first set of electrically conductive windings, at least one of said windings of said first set of electrically conductive windings contained between two adjoining layers of said dielectric sheets;

c) a second transformer having,

1) a second core extending through said layers of dielectric sheets, and,

2) a second set of electrically conductive windings, at least one of said windings of said second set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

d) at least one electrically conductive trace extending between said first set of electrically conductive windings and said second set of electrically conductive windings, said at least one electrically conductive trace totally contained between two adjoining layers of said dielectric sheets.

2. The power processing device according to claim 1, further including a first shielding layer disposed on a first exterior surface of said multilayer printed circuit board above said first set of windings.

3. The power processing device according to claim 2, further including a second shielding layer disposed on a second exterior surface of said multilayer printed circuit board below said first set of windings.

4. The power processing device according to claim 1, wherein said first set of electrically conductive windings and the second set of electrically conductive windings are electrically encapsulated.

5. The power processing device according to claim 4, wherein said at least one electrically conductive trace is electrically encapsulated.

6. The power processing device according to claim 1,

a) wherein said first set of electrically conductive windings include quiet windings; and,

b) wherein said first transformer further includes a secondary set of windings positioned to have electrical flow induced therein by said first core, said secondary set of windings positioned proximate to said quiet windings.

7. The power processing device according to claim 1,

a) wherein said first transformer further includes a secondary set of windings positioned to have electrical flow induced therein by said first core; and,

b) further including an open loop positioned to inject a current through parasitic capacitance in said secondary windings having a polarity opposite that of current in said first set of windings.

8. The power processing device according to claim 1,

a) wherein said first transformer further includes a secondary set of windings positioned to have electrical flow induced therein by said first core; and,

b) further including an open loop positioned proximate and on a second side of said secondary windings.

9. The power processing device according to claim 1,

a) wherein said first transformer includes a secondary winding;

b) wherein said second transformer includes a secondary winding;

c) wherein the secondary winding of said first transformer and the secondary winding of said second transformer are electrically connected in parallel; and,

d) wherein the first set of electrically conductive windings and the second set of electrically conductive windings are electrically connected in series.

10. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets;

b) a transformer having,

1) a core extending through said layers of dielectric sheets, and,

2) a first set of electrically conductive windings, at least one of said windings of said first set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

c) a first shielding layer disposed on a first exterior surface of said multilayer printed circuit board above said first set of windings.

11. The power processing device according to claim 10, further including a second shielding layer disposed on a second exterior surface of said multilayer printed circuit board below said first set of windings.

12. The power processing device according to claim 11, further including an electrically conductive trace contained between two layers of said dielectric sheets, said conductive trace communicating with said first set of electrically conductive windings.

13. The power processing device according to claim 10, further including:

a) a set of quiet windings contained within said first set of windings; and,

b) a secondary set of windings positioned to have electrical flow induced therein by said core, said secondary set of windings positioned proximate to said quiet windings.

14. The power processing device according to claim 10, further including:

a) a secondary set of windings positioned to have electrical flow induced therein by said core; and,

b) an open loop positioned to inject a current through parasitic capacitance in said secondary windings, said injected current having a polarity opposite that of current in said first set of windings.

15. The power processing device according to claim 10, further including:

a) a secondary set of windings positioned to have electrical flow induced therein by said core; and,

b) further including an open loop positioned proximate and on a second side of said secondary windings.

From the Preliminary Amendment: (claims 16-19)

16. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets; and,

b) a transformer having,

1) a core extending through said layers of dielectric sheets, and,

2) a first set of electrically conductive windings, at least one of said windings of said first set of electrically conductive windings contained between two adjoining layers of said dielectric sheets, and at least one of said windings positioned on an external surface of said multilayer printed circuit board.

17. The power processing device according to claim 16, further including a first shielding layer disposed on an exterior surface of said multilayer printed circuit board.

18. The power processing device according to claim 16, further including an electrically conductive trace contained between two layers of said dielectric sheets, said conductive trace communicating with said first set of electrically conductive windings.

19. The power processing device according to claim 18, further including at least one component secured to an exterior surface of said multilayer printed circuit board at a location over said electrically conductive trace.

From the Second Preliminary Amendment: (20-23)

20. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets;

b) a transformer having,

1) a first core extending through said layers of dielectric sheets, and,

2) a first set of electrically conductive windings, at least one of said windings of said first set of electrically conductive windings contained between two adjoining layers of said dielectric sheets;

c) an output choke having,

1) a second core extending through said layers of dielectric sheets, and,

2) a second set of electrically conductive windings, at least one of said windings of said second set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

d) at least one electrically conductive trace extending between said first set of electrically conductive windings and said second set of electrically conductive windings, said at least one electrically conductive trace totally contained between two adjoining layers of said dielectric sheets.

21. The power processing device according to claim 20, further including, an output choke having,

a) a third core extending through said layers of dielectric sheets;

b) a third set of electrically conductive windings, at least one of said windings of said third set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

c) at least one trace extending between said first set of electrically conductive windings and said third set of electrically conductive windings, said at least one trace totally contained between two adjoining layers of said dielectric sheets.

22. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets;

b) a first magnetic element having,

1) a first core extending through said layers of dielectric sheets, and,

2) a first set of electrically conductive windings, at least one of said windings of said first set of electrically conductive windings contained between two adjoining layers of said dielectric sheets;

c) a second magnetic element having,

1) a second core extending through said layers of dielectric sheets, and,

2) a second set of electrically conductive windings, at least one of said windings of said second set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

d) at least one electrically conductive trace extending between said first set of electrically conductive windings and said second set of electrically conductive windings, said at least one electrically conductive trace totally contained between two adjoining layers of said dielectric sheets.

23. The power processing device according to claim 20, further including, a third magnetic element having,

a) a third core extending through said layers of dielectric sheets;

b) a third set of electrically conductive windings, at least one of said windings of said third set of electrically conductive windings contained between two adjoining layers of said dielectric sheets; and,

c) at least one trace extending between said first set of electrically conductive windings and said third set of electrically conductive windings, said at least one trace totally contained between two adjoining layers of said dielectric sheets.

From the Third Preliminary Amendment: (24-32)

- - 24. The power processing device according to claim 22, further including an active element secured to said multilayered printed circuit board and connected to the first set of electrically conductive windings. - -

- - 25. The power processing device according to claim 24, further including:

a) a heat sink connected to one face of said multilayered printed circuit board opposing said active element; and,

b) a thermal via thermally connecting said active element and the heat sink. - -

- - 26. The power processing device according to claim 22, further including:

a) a base plate having an active element thereon; and,

b) a lead communicating between the active element on said base plate and said first set of electrically conductive windings. - -

- - 27. The power processing device according to claim 26, wherein said electrically conductive trace in communication with said lead is totally contained between two adjoining layers of said dielectric sheets. - -

- - 28. A power processing device comprising:

a) a multilayer printed circuit board having multiple layers of dielectric sheets;

b) a magnetic element having,

1) a core extending through said layers of dielectric sheets, and,

2) a set of electrically conductive windings, at least one of said windings of said set of electrically conductive windings contained between two adjoining layers of said dielectric sheets;

c) at least one electrically conductive trace, each electrically conductive trace communicating with one of said set of electrically conductive windings and totally contained between two adjoining layers of said dielectric sheets. - -

- - 29. The power processing device according to claim 28, further including an active element secured to said multilayered printed circuit board and connected to the set of electrically conductive windings. - -

- - 30. The power processing device according to claim 29, further including:

a) a heat sink connected to one face of said multilayered printed circuit board opposing said active element; and,

b) a thermal via thermally connecting said active element and the heat sink. - -

- - 31. The power processing device according to claim 28, further including:

a) a base plate having an active element thereon; and,

b) a lead communicating between the active element on said base plate and said set of electrically conductive windings. - -

- - 32. The power processing device according to claim 31, wherein said electrically conductive trace in communication with said lead is totally contained between two adjoining layers of said dielectric sheets. - -

Respectfully Submitted,

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